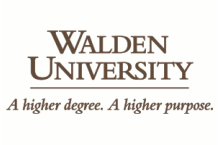

2020

Comparison of Health Factors and Outcomes Between Accredited and Nonaccredited Health Departments

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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Abstract

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Abstract

The launch of the Public Health Accreditation Board in 2012 established national public standards. This study examined possible correlations between the accreditation status of local health departments and specific indicators for health, including communicable disease, disease prevention and health promotion, and maternal child health factors, and outcomes of premature death and infant mortality. The population for the intervention group included all 212 local health departments accredited from September 2012 through December 2017. Accredited health departments were matched with nonaccredited health departments based on population, rurality, agency type, governance authority, and state public health structure. Linear regression analysis was performed on secondary data gathered retrospectively from publicly available sources including state vital statistics reports, National Center for Health Statistics and Centers for Disease Control and Prevention, and sign tests were performed for each dependent variable. Accreditation or non-accreditation of local health departments did not yield any significant difference in health indicators for communicable disease (chlamydia and human immunodeficiency virus), the disease prevention and health promotion indicator of body mass index, or the maternal child health indicator of low birth weight. For health status, smoking, physical activity, and diabetes and the maternal child health indicator of teen births, there was a significant difference, and the null hypothesis was rejected. The sign test was significant for all 11 indicators, indicating that accredited local health departments had more positive public health outcomes than nonaccredited ones ($p = 0.0005$). The findings suggest that investment in public health accreditation for a local health department is an investment in better health for members of the community.

Comparison of Health Factors and Outcomes Between Accredited and Nonaccredited Health Departments

by

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Chapter 1: Introduction to the Study

Introduction

For the first time in the long history of public health, national standards for state, local, tribal, and territorial health departments were established with the launch of the Public Health Accreditation Board (PHAB) in 2012 (Beitsch, Riley, & Bender, 2014; PHAB, 2017c). The PHAB accreditation program established standards in 12 "domain" areas of public health practice and defined the process for demonstrating conformity to the standards, with the ultimate goal of promoting and protecting the public's health through optimal organizational performance (Beitsch et al., 2014; PHAB, 2017c). To be accredited, local health departments must demonstrate organizational performance in areas such as disease surveillance and investigation, health promotion and education, enforcement and regulation, community health assessment to identify health priorities for improvement, establishment of a performance management system, use of quality improvement methodologies, and conduct of a program evaluation (PHAB, 2016a). As a result, established expectations and a measurement process now exist against a set of nationally recognized standards with the intent to define, advance, validate, and recognize optimal organizational performance (Beitsch et al., 2014; PHAB, 2013). However, the impact and influence of accredited agencies performing at this level on health outcomes of populations have not been studied (Beitsch et al., 2014; Riley et al., 2012). With more than 200 local health departments accredited by the PHAB to date, there is a need for studies such as this one to contribute to an evidence base regarding the impact and influence of public health accreditation. The findings of this study may also contribute to social change if accredited health departments, nationally recognized for their optimal

organizational performance, are better positioned to bring about social change through improved health outcomes and community health status.

This chapter provides a brief background on accreditation, a definition of the problem identified for the study, the study purpose, the research questions and hypotheses, the study's theoretical framework, and the nature of the study. In addition, definitions, assumptions, scope and delimitations, and limitations will be addressed. The significance and implications for positive social change related to the study findings for the issue selected for this dissertation study will also be discussed.

Background

Historically, the field of public health has been characterized as being "in disarray," with specific reference to a lack of national standards for organizational performance and expectations in public health practice resulting in lack of consistency across agencies and translating to varied quality of services in communities, as well as a lack of general accountability (Institute of Medicine [IOM], 1988, 2003). Given the current landscape of decreasing public health funding and increasing disease burden, the need for improvements in the public health infrastructure in the United States has been readily recognized at the national level for some time (IOM, 1988, 2003). In fact, soon after a 2003 IOM report was published, the PHAB was established in 2007 to address these issues with a primary goal of assuring a consistent and optimal level of health department performance in local communities (PHAB, 2017c).

Although the concept and practice of accreditation in public health are novel, accreditation has existed for decades in many other sectors. Insight into and understanding of the influence and impact of accreditation from the perspective of

individuals within accredited organizations can be drawn from existing empirical evidence in sectors such as health care. For example, in 2012, Alkhenizan and Shaw focused a systematic review of 17 studies on attitudes about accreditation in accredited health care organizations. Alkhenizan et al. (2012) reported some negative attitudes among professionals related to accreditation that stemmed from concerns about accreditation-related costs and lack of belief that accreditation had an impact on the organization. Braithwaite et al. (2010) conducted a blinded assessment among 19 health care organizations and nearly 1,000 staff. In this study, accreditation was positively correlated with organizational leadership and organizational culture, with the researchers reporting statistically significant trends between clinical performance and accreditation (Braithwaite et al., 2010). There was no correlation between organizational climate and accreditation or consumer involvement and accreditation (Braithwaite et al., 2010). In public health, only one study has been conducted, prior to the inception of the PHAB national voluntary public health accreditation program, to examine perceived benefits of an existing state-specific accreditation program from the perspective of staff and leadership. Based on a survey of local health department administrators and staff, Davis et al. (2011) reported perceived increases in local funding, improved working relationships with Board of Health members, and improved policy development related to being accredited. Of particular interest was the finding that less than 1 in 4 local health departments reported improved relationships with county commissioners, only about 1 in 3 reported improved relationships with community partners following state-level accreditation, and there was no reference to engagement with the community/public receiving public health services (Davis et al., 2011).

Studies have also been conducted in the health care sector to attempt to measure change within organizations following accreditation. In 2010, Pomey et al. reported findings from a retrospective, qualitative case study of five health care organizations during the accreditation readiness process, focused specifically on detectable enhancement of quality and organizational change resulting from accreditation. Pomey et al. reported that accreditation was effective in prompting organizational change; however, findings varied based on the learning that occurred during the accreditation process, as I will discuss in Chapter 2. Similarly, qualitative research methods have been used to explore staff perceptions of the accreditation process within health care organizations (hospitals). Greenfield, Pawsey, and Braithwaite (2010) reported performance and quality to be positively influenced by accreditation. No similar studies have been conducted to examine such changes in quality within local health departments as a result of achieving national public health accreditation.

Of particular interest are studies conducted using quantitative methods to understand whether an association exists between accreditation and measurable quality indicators in healthcare organizations as outcomes. Using a national data set, Schmaltz, Williams, Chassin, Loeb, & Wachter (2011) conducted a quantitative study of accredited hospitals, finding increased quality and performance in accredited organizations. With studies such as this one lacking in public health, a practice-based research agenda is needed around the concept of public health accreditation from many perspectives, including the relationship of community health status and health outcomes to accreditation (Riley et al., 2012). I sought to address this gap in the literature by

examining the association of accreditation and health outcomes between accredited and nonaccredited local health departments.

Problem Statement

Existing research using robust, scientific methods is lacking on factors that promote or impede local health departments' efforts to achieve full accreditation status. There is also a need for research from an organizational perspective on the impact of accreditation on local health departments, the public and the public's health, and community partners (Beitsch et al., 2014; Riley et al., 2012). In the healthcare sector, significant associations have been found between organizational culture and accreditation, and between some organizational outcomes and accreditation (Braithwaite et al., 2010; Schmaltz et al., 2011). In the field of public health, only one survey of local health department representatives reported positive benefits related to an independent, state-specific accreditation program that existed prior to national voluntary accreditation (Davis et al., 2011). With more than 200 local health departments recognized as accredited by PHAB, it is timely and critical to begin to establish a scientific evidence base to enable examination of the association of accreditation on performance and quality of the services delivered by local health departments (PHAB, 2017a). Furthermore, an empirical evidence base is lacking regarding the effect of accreditation on population health outcomes in the jurisdiction of local health departments that have demonstrated optimal organizational performance by achieving accreditation.

Purpose of the Study

With the recent implementation of voluntary public health accreditation, studies are needed to determine if there is an association between accreditation status and health

factors and health outcomes. In this quantitative study, I examined the possible correlation between the accreditation status of local health departments and identified, specific indicators for health factors, including indicators for communicable disease, disease prevention and health promotion, and maternal child health and health outcomes such as premature death and infant mortality, each of which is detailed in Chapter 3. The independent variable for this quantitative study was accreditation status (accredited or not accredited), and the dependent variables (which could be influenced by accreditation status) were the health factors and health outcome indicators defined in Chapter 3. Previously collected and publicly available data were used to construct a profile of the study population of nationally recognized, accredited local health departments and a matched control group of nonaccredited local health departments, for the period defined for this study, which is described in detail in Chapter 3. The intended outcome of this study is to contribute to addressing an existing gap in the literature and the current lack of empirical evidence regarding the association of public health accreditation on health between accredited and nonaccredited local health departments.

Research Questions and Hypotheses

The research questions for this study were as follows:

RQ1: Do health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI $\geq$ 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and low birth weight differ between accredited and nonaccredited local health departments?

$H_0$1: There is no statistically significant difference ($p < 0.05$) in health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI > 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and low birth weight between accredited and nonaccredited local health departments.

$H_1$1: There is a statistically significant difference ($p < 0.05$) in health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI > 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and low birth weight between accredited and nonaccredited local health departments.

RQ2: Do health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) differ in public health jurisdictions between accredited and nonaccredited local health departments?

$H_0$2: There is no statistically significant difference ($p < 0.05$) in health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) between the public health jurisdictions of accredited and nonaccredited local health departments.

$H_1$2: There is a statistically significant difference ($p < 0.05$) in health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) between the public health jurisdictions of accredited and nonaccredited local health departments.

Hypothesis testing was conducted using secondary data for comparison between the intervention and control groups. If data demonstrated a statistically significant difference in health indicators and/or a statistically significant difference in health outcomes, then the null hypothesis was rejected.

Theoretical Framework

Review of the literature supported the need to develop an understanding of organizational change and basic concepts associated with organizational culture and performance as they pertain to local health departments and public health. This understanding underlies the theoretical framework selected for this study. It is important to note that there is no definition considered to be universal or agreed upon related to the concept of organizational performance and culture (Bellot, 2011). In addition, when considering theoretical frameworks and conceptual models for this study, it was necessary to consider other factors such as what type of approach was represented by each organizational change model, at what level the focus was for change in each model, when the model was intended to be applied (i.e., the time frame), what the source of change was for each model, and the epistemological approach of each model (Morris, 2014). Therefore, the selection of Schein's life-cycle model was based on the theoretical

framework or model that best aligned with this study (Bellot, 2011; Morris, 2014; Schein, 1990).

Schein's model was initially developed in 1985 (Schein, 1990). The model is referenced as being well-defined and has been widely used (Morris, 2014). More recently, a study was conducted by Hogan & Coote (2014) to test the model, which contributed further to empirical evidence of the relationships hypothesized by Schein's model. Schein's life-cycle model is characterized as being dynamic and multilayered (three layers) and representative of how the culture of an organization is learned, how it changes over time, and how it is passed on over time among the individuals within the organization (Hogan & Coote, 2014; Morris, 2014). Behaviors that are observable in an organization comprise the first level of Schein's model, while nonobservable but measurable attributes such as perceptions and attitudes comprise the second level, which can be captured through interviews or surveys (Bitsani, 2013; Hogan & Coote, 2014). The third and deepest level involves the values, rituals, symbols, and beliefs of those within the organization, which are difficult to capture or measure (Bitsani, 2013; Hogan & Coote, 2014). Schein's model is further detailed in Chapter 2.

Nature of the Study

For this dissertation study, I applied a quantitative strategy to assess accreditation as an intervention by using a historical prospective quasi-experimental (nonequivalent group) design to answer the research questions. Because local health departments are "pregrouped" when they formally seek accreditation, there was no additional random assignment to groups for this study. Local health departments that had been recognized as accredited by the PHAB constituted the intervention group, and local health departments

that were not accredited constituted the control group. The use of the selected study design enabled the incident event of nationally recognized accreditation status to be correlated with specific population health outcomes and public health service indicators, with control for potential selection bias. As local health departments are accredited at varying points in time, the use of this study design enabled management of the effect of time during the study period, with attention appropriately given to limits of comparability due to no randomization as well as possible threats to internal validity.

The PHAB website was used to identify the intervention group of accredited local health departments (PHAB, 2017a). The National Association of City and County Health Officials (NACCHO) served as the source for a list of all local health departments in the United States. All research questions for the dissertation study used preselected variables and measures from secondary data sources that were publicly available. These variables and measures were representative of a set of credible indicators of health factors and health outcomes available for all local health departments/public health jurisdictions. The variables and measures that comprised the health indicators and outcomes for this study were inclusive of selected indicators for demographic data (four variables), communicable disease (two variables), health promotion and disease prevention (five variables), and maternal child health (two variables), as detailed in Chapter 3. There were two indicators for health outcomes: premature death and deaths under 1 year. For purposes of testing the hypotheses for this dissertation study and evaluating whether there was a difference between the two groups of accredited and nonaccredited local health departments, inferential statistics including linear regression were used for this study, which proposed a nonequivalent group design with nonrandomized intact groups.

Definitions

Core functions of public health: Governmental public health departments have three core functions of assessment, policy development, and assurance, which are intended to assure conditions where people can be healthy in their communities (Centers for Disease Control and Prevention [CDC], 2016b).

Essential public health services: Common public health services to be carried out by all health departments are represented by the 10 essential public health services: (a) monitoring health status; (b) diagnosing and investigating diseases and threats; (c) informing and educating the public; (d) working with community partners to solve health problems; (e) developing policies and plans to promote health; (f) enforcing regulations and laws to protect health; (g) linking people to needed health services; (h) developing a competent public health workforce; (i) conducting evaluations for effectiveness, quality, and performance; and (j) partnering on research to develop new knowledge and understanding in public health (CDC, 2016b).

Local health department: A unit of local government responsible for assuring or creating conditions where people can be healthy in their communities (NACCHO, 2005). Based on the public health jurisdictions, a local health department can be defined as city, county, city-county, or multijurisdictional. In addition, a local health department may be designated as local, tribal, or territorial.

National voluntary public health accreditation: The process of measuring health department performance against a set of practice-focused, evidence-based, and nationally recognized public health standards and formally recognizing the health department as

having completed a process to demonstrate meeting those standards in their performance (PHAB, 2017c).

Performance management system: Integration into daily health department activities of the following: (a) setting organizational objectives, (b) identifying indicators to measure performance to meet objectives, (c) measuring and monitoring indicators regularly, and (d) identifying where additional quality improvement efforts are needed to meet indicators (PHAB, 2013).

Public health: Activities undertaken to promote and protect the health of the public, which are assumed to be community-based in serving respective jurisdictional populations (PHAB, 2017c).

Assumptions

One assumption of this study was that becoming accredited through the PHAB demonstrates an optimal level of performance and quality of services delivered to the individuals in a community and the health outcomes that can be measured at a population level in local public health jurisdictions. It was further assumed that standards and measures are adequately met when a health department is formally recognized as being accredited by the PHAB. It was also assumed that once a correlation between accreditation and health indicators and/or outcomes is determined, findings can impact how accreditation is perceived, messaged, and leveraged by local health departments, stakeholders, and individuals in communities, as documented and measurable benefits of accreditation. A final assumption was that the data collected regarding health indicators and outcomes were accurate and representative of the populations represented in the jurisdictions used for this study.

Scope and Delimitations

This study was delimited to publicly available, county-level data that were available for all counties in the United States, as well as to accredited (recognized for performance) and nonaccredited local health departments (with state, tribal, or territorial health departments excluded). The study focused on health data as indicators and enabled comparison between accredited and nonaccredited local health departments where accreditation status is the indicator of performance. Study findings could inform practitioners in public health; policy makers at local, state, and national levels; individuals in local communities (the public); as well as stakeholders who have been involved in the development of the national voluntary public health accreditation program and health funders seeking to make investments where they can have the greatest impact. In addition, findings could contribute to filling a gap in the literature pertaining to the influence and impact of national public health accreditation.

Limitations

The limitations of the study included the focus on local health departments accredited between September 2012 and December 2017, not including state, tribal, or territorial health departments, and the inability to generalize study findings to all health departments. This dissertation study focused on the jurisdictional population of local health departments accredited by the PHAB from September 2012 (from the accreditation program's inception) through December 2017 to explore the possible correlation between local health department accreditation and health indicators and outcomes within their respective local public health jurisdictions. I did not examine accreditation in the context of state, tribal, or territorial health departments, nor did I consider departments accredited

after December 2017. Moreover, I did not take into account the length of time that health departments spent in the accreditation readiness process, or whether departments had completed a corrective action plan after a site visit and prior to being granted accredited status. A further limitation of this study was that it did not assess the influence or impact of accreditation on community-based public health and community ratings of public health operations and services. Although the study did not include randomization and the findings are not generalizable to all local health departments across the United States, the study findings may be used by personnel of local health departments to better understand how accreditation may influence the services they deliver and health outcomes that result in their communities.

In that the focus of this study was local health departments, the results are not generalizable to other types and levels of health departments (i.e., state, territorial, and tribal). Further, it is possible that local health departments that have already become accredited have some characteristics in common, which could affect the ability to generalize the results. However, data were collected from local health departments of various sizes in multiple states, in public health jurisdictions of varying population size and with various public health organizational structures. As matching was incorporated into the sampling methodology, both the accredited and nonaccredited populations of local health departments were reflected in the study.

Significance

The first-ever national standards established by the PHAB for voluntary public health accreditation serve as benchmarks to recognize local health departments that have demonstrated optimal organizational performance (PHAB, 2016a). The PHAB

accreditation program, as it is adopted and becomes integrated across the United States, represents a significant change in the field of public health as health departments are recognized for documenting and demonstrating organizational performance and capacity in meeting the core functions and essential services of public health (PHAB, 2017b). Given the recent inception of public health accreditation, there is a need to develop an evidence base and body of knowledge through qualitative and quantitative research methods regarding all aspects of the process of becoming accredited, as well as the outcomes and impact of accreditation on organizations and the populations they serve (Beitsch et al., 2014; Riley et al., 2012). Findings of this quantitative study may help to fill a gap in public health knowledge by contributing to the evidence base on the association of accreditation and health status and health outcomes. The findings may provide knowledge that is helpful in supporting the development of programs that promote health department performance through accreditation and among policy makers to support policy actions supporting accreditation. The investments made by any agency undertaking the accreditation readiness process are significant and influence the utilization of public resources. Therefore, the process of becoming accredited must also be justified through measurable indicators of quality, performance, and outcomes at the community level. The significance of the study relates to its potential social change implications for improving the health of populations and communities through health department performance (accreditation).

Summary

In response to national reports citing lack of national standards for organizational performance in public health practice, lack of consistency in performance across

agencies, differing quality of services in local communities, and lack of general accountability, the first national voluntary public health accreditation program was developed (IOM, 1988; IOM, 2003, PHAB, 2017c). Currently, more than 200 local health departments in the United States have been recognized for their organizational performance in being designated as accredited by PHAB (PHAB, 2017a). Analysis of the literature indicates that the knowledge gap related to public health accreditation relates to all aspects of the accreditation process, benefits, and outcomes. Although studies on the benefits and outcomes of accreditation are available in other fields such as health care, no previous studies have examined the influence and impact of national voluntary public health accreditation (Beitsch et al., 2014; Riley et al., 2012). Through this quantitative study, I sought to fill this knowledge gap using publicly available data to investigate whether there is an association between local health department accreditation and health indicators and outcomes. The evidence generated in the results may inform public health practitioners, policy makers, funders, and the accrediting body. Chapter 2 provides a review of the literature on accreditation, the theoretical foundation of this study, and key variables and concepts that formed the basis of the study.

Chapter 2: Review of the Literature

Introduction

The information in this literature review provides perspective and insight on the need to further examine the influence of accreditation on local health departments, specifically in relation to performance and health status and outcomes. The review of literature is organized according to five primary themes: (a) public health infrastructure, (b) accreditation, (c) accreditation and performance, (d) accreditation and outcomes, and (e) theoretical framework. These themes are used to establish an understanding of the lack of an empirical evidence base, including indicators, methods, and tools, to examine the impact and outcomes of accreditation.

The review of literature was conducted using CINAHL & MEDLINE, PubMed, and SAGE Journals databases in the Walden University Library, as well as Google Scholar. In addition, other resources specific to public health accreditation in practice (i.e., resources from the PHAB) and the work of Schein on the theoretical framework were used. The following comprise the primary search terms used in the literature review process: *accreditation*, *accreditation standards*, *accreditation readiness*, *determinants of public health performance*, *health department effectiveness*, *health department performance management system*, *health indicators*, *health outcomes*, *public health accreditation*, *public health infrastructure*, *public health performance*, and *public health structure*.

Public Health Infrastructure

A public health system infrastructure of governmental and nongovernmental health departments exists across the United States, with a primary mission of delivering

public health services in accordance with three core functions of assessment, policy development, and assurance intended to protect and promote the public's health (Carman & Timsina, 2015; CDC, 2016b; Hyde & Shortell, 2012). All local health departments are responsible for the delivery of 10 essential public health services related to the core functions of public health. Among governmental state and local health departments, not including tribal organizations and U.S. territories, approximately 12 states (24%) have a centralized public health system (health departments are primarily part of the state system), 53% (27) have a primarily decentralized system (local autonomy), 14% (7) function under a combination of a mixed centralized and decentralized structure, and 10% (5) have some level of shared authority (CDC, 2016a).

The U.S. public health system is more exactly defined as being comprised of 50 state departments of health, 37 tribal organizations that focus on public health, departments of health for eight U.S. territories, and about 2,800 local health departments (CDC, 2013; 2016c; NACCHO, 2014). While all are responsible for the delivery of the same 10 essential public health services, there are specific factors that uniquely characterize local health departments, the only agency type used in this study, very broadly. Thus, the public health infrastructure can further be depicted as a "patchwork system" of organizations that differ based on population size, rurality of the public health jurisdiction, agency type, governance structure and authority, type and mix of agency financing and expenditures, and the breadth and mix of public health services and programs offered.

Population Size and Rurality

The local health department workforce in the United States serves a broad range of population sizes, with the number of people served by individual public health jurisdictions ranging from less than 50,000 to more than 1,000,000 (NACCHO, 2014). Approximately one-half of the U.S. population is served by only 5% of local health departments; thus, the majority of local health departments are smaller agencies serving local communities (NACCHO, 2014). The population served by local health departments may also be considered in terms of rurality, which varies widely; for instance, Pocahontas County, West Virginia has 9.3 persons per square mile, whereas New York City has 27,012 persons per square mile. Regardless of their characteristics, all local public health jurisdictions share the same mission of assessment, policy development, and assurance to protect the health of the population (U.S. Census Bureau, 2016a; 2016b).

Agency Type

About 68% of local health departments are county-based agencies, 20% are township or city based, 8% have some type of multicounty configuration (i.e., district or regional), and 4% have some other configuration (NACCHO, 2014). Thus, agency type varies not only among states, but also among individual counties within states.

Governance Authority

Local health departments are also unique in the ways in which they are governed or have oversight for a public health jurisdiction. A local board of health or policy-making board provides agency oversight for about 77% of local health departments in 27 states in the United States, whereas 16% of local health departments are formally part of a state agency having authority and oversight, and 7% of local health departments have

some type of shared governance (NACCHO, 2014). Governance authority is made more complex, and varies further, by the different levels or types of authority and function among local boards and is unique to each. Under individual state statutes, boards of health may serve in an advisory capacity only or may have authority to establish policy or regulations (NACCHO, 2014).

Financing and Revenue

Expenditures, funding sources, and per-capita spending in local public health jurisdictions represent additional areas of broad variation among local health departments. Such variations include per-capita expenditures, revenue overall, revenue from local sources, and authority of the governing entity to generate revenue to support public health service delivery (Mays et al., 2009; NACCHO, 2014; 2016a). All local health departments are supported by some combination of federal (direct and pass-through), state, local, and sometime private funding such as grants, as well as revenue from clinical services, which is also unique to each agency (Association of State and Territorial Health Officials [ASTHO], 2014; NACCHO, 2014).

Services and Programs

The mission and purpose of all local health departments involve promoting and protecting the health of the public; however, the types of public health services provided or offered by each agency to accomplish this also vary. Results from the most recent NACCHO Profile Survey (2014) indicated that among 87 programs/services included in the survey, seven services were offered by 75% or more of local health departments. These included communicable and/or infectious disease surveillance (91%), adult immunizations (90%), children's immunizations (90%), tuberculosis screening (83%),

environmental health surveillance (78%), food service establishment inspections (78%), and tuberculosis treatment (76%).

It is evident that local health departments are diverse in population size served, rurality, organization type, type of governance authority, agency financing, and programs and/or services offered. However, there is not diversity in the mission of public health agencies. The mission of all local health departments is to deliver 10 basic or essential public health services to meet the three core functions of assessment, policy development, and assurance to protect and promote the public's health (Hyde et al., 2012). It is unclear that smaller local health departments can deliver all essential public health services as effectively as larger agencies, that individuals in all communities are receiving the same quality and quality of basic public health services, or that local public health expenditures result in the delivery of services at acceptable levels of performance. Lacking historically in public health has been a way in which to assess and measure performance and assure consistency, accountability, and availability of essential public health service delivery within this "patchwork" public health system across all local public health agencies (Committee for the Study of the Future of Public Health, 1988; IOM, 2003).

Accreditation

Accreditation is a way in which the expected or acceptable performance of an organization can be defined using an established set of standards, and then measured in order to quantify the quality and performance of services or products delivered by the organization. Accrediting bodies generally have a mission that is centered around improving quality and performance and thus have the potential to bring about organizational change within individual organizations, as well as broader changes across

a specific field or sector as many organizations are designated as accredited (Hamm, 2007).

Health care organizations have a longstanding history of established national accreditation programs being in place. Many types of health care organizations (i.e., hospitals, surgery centers, home health care centers, ambulatory surgery centers, and long-term care facilities) and health-related programs (i.e., disease-specific care such as total joint replacement or chest pain centers) have ascribed to national accreditation standards for decades with numerous stated benefits (The Joint Commission, 2016a; 2016b). Designation as an accredited organization is intended to represent formal recognition that an organization has demonstrated a specific level of performance in meeting a standard set of benchmarks and has made a commitment to continuously improving the quality of services, products, and performance delivered. What is ultimately represented by the successful adoption and achievement of the standards of an accreditation program is a commitment within the accredited organizations and across the field or sector to long-term performance and quality in the delivery of services.

Rationale for Public Health Accreditation

In response to an IOM Committee for the Study of the Future of Public Health (1988) report on the future of public health, which described the U.S. public health system as extremely disorganized, a common definition and mission of public health were established in 1994 through the development of three core functions and 10 essential public health services as performance standards for health departments (CDC, 2016b). Over the next decade, an empirical evidence base evolved based on research conducted to understand the relationship between performance in delivering essential

services and attributes and characteristics of health departments. Studies during this time focused primarily on the association of agency performance and factors such as organizational capacity and structure, population size and socioeconomic status, governance authority, and funding and expenditures (Hajat et al., 2009; Kennedy, 2003; Mays et al., 2004; Scutchfield, Knight, Kelly, Bhandari, & Vasilescu, 2004). Studies demonstrated not only variability of agency characteristics, but also higher levels of performance in larger communities, in geographic locations having better socioeconomic status, and in health departments with greater agency capacity. These findings provided further indication of the need for additional studies to determine if all local health departments, regardless of size, perform equally well in meeting their mission.

In 2003, another IOM report was released on the future of public health, still focused on the variation of public health agencies and the lack of any evidence base to demonstrate their effectiveness. This IOM report recommended exploration of the development of an accreditation program to bolster accountability and improvements in quality and performance of governmental public health agencies (IOM, 2003). A 2006 follow-up report with final recommendations for a national voluntary public health accreditation program was released in support of establishing an accreditation program (Planning Committee of the Exploring Accreditation Project, 2006). The report further detailed a model for the development of a public health accreditation program and organized a set of standards that aligned with the 10 essential public health services in which health departments should be held accountable for performance (Table 1).

Inherent throughout the essential services, and eventually within each domain of the accreditation standards, is the expectation that health departments are engaged at a

community systems level with partners and the public to improve services, health status, and health inequalities of populations at higher risk of poor health outcomes. Some domains are focused solely on engaging the public (Domain 3), while others are focused on community partnerships to improve health (Domains 4 and 7; PHAB, 2016a). In addition, multiple standards require the collection of primary data from the public to understand health issues and needs (Domains 1 and 5) and in the development of health education and promotion strategies (Domain 3). There are no domains that do not provide accountability and expectations for health department performance to the community, at-risk populations, partners, and/or elected officials.

Furthermore, Version 1.5 of the PHAB standards integrated significant changes reflecting a greater focus on cultural competency and health equity (PHAB, 2016a). Measures were specifically added for local health departments to address factors that place populations at higher health risk and contribute to worse health outcomes. In addition, community health improvement planning is required to address social determinants of health, causes of health inequities, assets and resources in the community, and barriers to health care access.

Table 1

Alignment of Essential Public Health Services and Accreditation Domains

Essential public health services		Accreditation domains	
1	Monitor health status to identify and solve community health problems.	1	Conduct and disseminate assessments focused on population health status and public health issues facing the community.
2	Diagnose and investigate health problems and health hazards in the community.	2	Investigate health problems and environmental public health hazards to protect the community.
3	Inform, educate, and empower people about health issues.	3	Inform and educate about public health issues and functions.
4	Mobilize community partnerships and action to identify and solve health problems.	4	Engage with the community to identify and address health problems.
5	Develop policies and plans that support individual and community health efforts.	5	Develop public health policies and plans.
6	Enforce laws and regulations that protect health and ensure safety.	6	Enforce public health laws.
7	Link people to needed personal health services and assure the provision of health care when otherwise unavailable.	7	Promote strategies to improve access to health care.
8	Evaluate effectiveness, accessibility, and quality of personal and population-based health services.	8	Maintain a competent public health workforce.
9	Evaluate effectiveness, accessibility, and quality of personal and population-based health services.	9	Evaluate and continuously improve processes, programs, and interventions.
10	Research for new insights and innovative solutions to health problems.	10	Contribute to and apply the evidence base of public health.
		11	Maintain administrative and management capacity.
		12	Maintain capacity to engage the public health governing entity.

As a formal response to the identified need to increase accountability and performance of governmental public health agencies, the first-ever national voluntary public health accreditation program was established in 2011 with the PHAB (a nonprofit organization established in 2007 and primarily supported by the Robert Wood Johnson Foundation and the CDC) as the accrediting body (Bender, Kronstadt, Wilcox, & Parker, 2014). Accreditation standards were developed through think tanks, alpha and beta testing, and the input of more than 400 public health practitioners and leaders in the field to ensure that the standards were relevant for public health practice (Bender et al., 2014; Ingram, Bender, Wilcox, & Kronstadt, 2015). Standards were developed to align with recognized basic public health services as detailed in Table 1. Based on recognition that the range of population sizes served by local health departments is broad, and that the characteristics of health departments and the scope of services offered vary significantly, the same national standards were applied to all agencies as benchmarks to provide assurance to members of the public that they can expect to receive the same quality public health services in any community.

Accreditation Requirements

Accreditation requirements for local health departments include meeting 32 standards (containing 201 measures) in 12 domain areas with unique requirements for state health departments, local health departments, and tribal health departments. However, the domains contain standards that represent the 10 essential public health services, with the addition of two areas for finance/administration (Domain 11) and the governing entity (Domain 12) for all public health agency types (PHAB, 2016a). The accreditation application process is open to any health department regardless of size,

location, capacity, or other contextual factors, with three established prerequisites (strategic plan, community health assessment, and community health improvement plan) to begin the application process. As of the time of this study, 162 local health departments and 26 state health departments were accredited in 46 states, with an additional 134 local health departments in the application process (PHAB, 2016b).

Accreditation and Performance

It is well recognized that the concepts of quality improvement and performance underlie national voluntary public health accreditation. The exploration and establishment of a national public health accreditation program and standards has enabled early evaluation to be conducted, at the outset of the accreditation program, on the influence of accreditation on health departments. With the infusion of funding to 76 state, tribal, and local public health agencies, the National Public Health Improvement Initiative (NPHII) demonstrated that the commitment to accreditation readiness resulted in some advances toward meeting the three pre-requisites and other readiness processes of the accreditation process, such as establishing a formal performance management system (Craig, Pietz, Corso, Erwein, & Monroe, 2014; Emer, Cowling, Mowlds, & O'Connor, 2014; McLees et al., 2014; Rider, McKasson, Frazier, Corso, & Hsu, 2015). As a result of the NPHII, 15% of all awardees reported completing all three accreditation pre-requisites (strategic plan, community health assessment, and community health improvement plan), and 14% reported completing two of the three; 90% reported quality improvement activities being undertaken, and 26% reported completing an organizational assessment against accreditation standards (McLees et al., 2014). Similarly, NACCHO has diffused funding through a competitive grant award program (the Accreditation Support Initiative [ASI]),

to promote ‘big city’ health departments and any local health department in general, in undertaking accreditation readiness through the provision of technical assistance (Monteiro, Fisher, Daub, & Zaperetti, 2014). To date, multiple iterations of the ASI have been completed (NACCHO, 2016b). No additional studies, including NPHII and ASI, have conducted follow up of state and local health departments over time after the infusion of funding or technical assistance stopped to determine if agencies successfully proceeded with becoming fully accredited; however, the importance of other factors such as financial incentives to prepare for and seek accreditation (thus improving performance), have been reported (Thielen et al., 2014).

Accreditation and Population Health Outcomes

In general, accreditation program standards generally focus on structure, process, and/or performance of an organization, with performance-based standards being those most oriented toward outcomes and an orientation towards quality of all three (Hamm, 2007). Accreditation of health care organizations is intended to provide programmatic structure that assures system-wide quality and performance; however, existing empirical evidence-base to support its effectiveness with regard to improving outcomes based on performance of hospitals and other health care organizations, is lacking (Hinchcliff, Greenfield, & Moldovan, 2013). Approximately 60 research studies have been conducted on health care accreditation in the United States, primarily of hospitals, with a paucity of research in the past five years. The majority of studies have focused on organizational impact, organizational culture, attitudes towards accreditation, assessment of the accreditation program, and relationship of accreditation to process-related performance,

with few focused on performance or outcomes (Alkhenizan et al., 2012; Braithwaite et al., 2010; Hinchcliff et al., 2012; Schmaltz et al., 2011).

Of the few studies that have been conducted on health care accreditation and performance, the majority examined process related performance, with very few focused on outcomes (Chandra et al., 2009; Griffith, Knutzen, & Alexander, 2002; Lake, Shang, Klaus, & Dunton, 2010; Lichtman, Jones, Wang, Watanabe, & Goldstein, 2011; Menachemi, Chkmaitov, Brown, Saunders, & Brooks, 2008; Schmaltz et al., 2011; VanSuch, Naessens, Stroebel, Huddleston, & Williams, 2006; Weeks, Schmidek, Wallace, & Dimick, 2007). Of these studies, only statistically small positive differences or no differences were reported between accredited and nonaccredited programs (hospitals, centers, or programs). Thus, there is no existing, empirical evidence base that supports correlation of accredited health care organizations and improved performance, either process or outcomes-based, further establishing the need for this type of study.

An existing empirical evidence-base to support the effectiveness of national, voluntary public health accreditation with a focus on outcomes is also lacking. The need for rigorous research related to structure, process measures, and performance measures, but especially outcomes, between accredited and nonaccredited health departments, is needed (Beitsch et al., 2014; Riley et al., 2012). In addition, there is a need for research related to specific aspects and/or standards and measures of accreditation such as partner engagement with the community to understand and address health issues as involvement of community partners is involved throughout all 12 domains as an expectation of an accredited agency. Research is also needed on the impact of accreditation on healthy inequalities, workforce development based on the public health competencies, and

improved quality and timeliness of disease surveillance. Public health experts have indicated that there is need for an agenda for practice-based public health research, including the conduct of studies on: a) demonstrating reliability and validity of PHAB standards; b) the impact of instituting quality improvement and performance management as a required component of accreditation; d) the resources and capacity needed to successfully become an accredited health department; d) the adoption and uptake of accreditation by health department staff, and specifically e) the association of accreditation and health outcomes (Riley et al., 2012).

Similar to the health care field, only a limited number of research studies have been conducted on public health accreditation in the United States. Prior to the implementation of national, voluntary public health accreditation, one study examined local health department characteristics (jurisdictional, organizational, and structural) in relation to agency performance using the 10 essential public health services (the precursor and foundation of the accreditation domains) (Hyde et al., 2012). Another study reported positive benefits related to accreditation among local health department representatives as respondents in a state-level accreditation program, but used only self-reported data and was conducted prior to the establishment of national accreditation (Davis et al., 2011). Only one study, conducted prior to the launch of the national, voluntary accreditation program examined the relationship between self-reported agency performance and community health outcomes (Kanarek, Stanley, & Bialek, 2006). Kanarek et al (2006) reported that health department performance was accountable for a portion of community health status, and was in fact, a primary predictive factor.

Studies conducted since the launch of the PHAB accreditation program have focused on predicting intention to seek accreditation, having pre-requisites completed, the use of quality improvement methods or tools, factors that influence the adoption of quality improvement practices, identification of perceived barriers to accreditation, the influence of incentives on accreditation, and the level of engagement in the accreditation process by local health department type (Chen et al, 2015; Luo, Sotnikov, McLees, & Stokes, 2015; Madamala, Sellers, Beitsch, Pearsol, & Jarris, 2012; Shah et al., 2015). No studies have been conducted examining the influence of national, voluntary accreditation standards, all of which include engagement with the community and community stakeholders/partners, as indicators of health department performance and service delivery. Similarly, no studies have been conducted examining the influence of national, voluntary public health accreditation on health outcomes or health disparities.

Population Health Indicators and Outcomes

While local health departments vary according to numerous factors, all local health departments provide basic public health services intended to promote health, and detect and prevent disease and preventable deaths of a population (Public Health Foundation, 2016). Basic public health services include, but are not limited to, detecting and controlling infectious or communicable diseases; addressing prevention and promotion of chronic diseases, preventing injuries; assuring safe food and water, investigating complaints; assuring access to health care services; and, being prepared to respond to bioterrorism or other events that may threaten the public's health.

It has long been established that public health programs, carried out in large part by local health departments at the community level, have resulted in decreases in

morbidity and mortality (CDC, 1999; 2011). More recently, studies have been conducted to demonstrate the significant impact of public health funding on the reduction of morbidity and mortality at local and state levels (Brown, 2014; Erwin, Greene, Mays, Ricketts, & Davis, 2011; Grembowski, Bekemeier, Conrad, & Kreuter, 2010; Mays & Smith, 2011). Research has also been conducted to study the relationship between the capacity of local health departments (funding, staffing and services) on mortality rates, demonstrating that increases in funding and/or services were associated with reductions in mortality (Schenck, Meyer, Kuo, & Cilenti, 2015).

There remains however, no one accepted set of standard public health service indicators, that together, are used to collectively evaluate the impact of basic public health services on health outcomes for all local health departments. Efforts such as the County Health Rankings, America's Health Rankings, and Community Health Status Indicators, are intended to provide state or county level health indicators and health profiles as factors that influence health, where each is unique and does not necessarily reflect or align with essential public health services (CDC, 2015; University of Wisconsin, 2016; United Health Foundation, 2016).

Public health accreditation provides a means for measuring performance based on the 10 essential services, but does not provide indication of the impact of service delivery on health-related outcomes, health disparities, morbidity and/or mortality. Subsequently, additional inquiry is needed to identify a set of credible indicators which are available for all local health departments (i.e. preventive screening measures, immunization rates, access to care, and health outcomes) to evaluate if nonaccredited agencies and accredited

agencies (having demonstrated a performance and quality according to the standards) are different.

Theoretical Foundation

The selection of a theoretical foundation was accomplished by systematically assessing numerous models of organizational culture and organizational change. The process included examining the epistemology of models, what was proposed (the concept) in terms of organizational change by each model, and factors such as the focus on what level within the organization change occurred, time related to change in an organization, and the source of the change. Understanding that there are many definitions for the concepts of organizational culture and organization change, Schein's life-cycle model was selected as the most appropriate for this study (Bellot, 2011; Morris, 2014; Schein, 1990; 2010).

Schein's model is based upon the following assumptions regarding organizational culture and change: a) change within an organization can be understood at multiple levels; b) change within an organization can be passed on over time; and c) culture is learned within an organization (Hogan & Coote, 2014; Morris, 2014). The model was developed in 1985, modified by Glendon and Stanton in 1999, and has been broadly used (Morris, 2014). In 2014, Hogan & Coote more recently provided evidence to support the relationships in the model as hypothesized by Schein.

Schein's model proposes that organizational change can occur at three levels. The primary differentiating factor between the levels is the degree to which culture is visible or evident to an observer. At the first level, one can tangibly observe the structure, processes and behaviors within an organization that comprise its culture, keeping in mind

that such observations are not the true essence of the culture but representations of it (Bitsani, 2013; Hogan & Coote, 2014; Schein, 2010). Visible elements of culture in an organizational include organizational charts; stated core values; strategic plans; written policies and procedures; the products, programs, or services delivered; how the organization uses technology; and, how individuals within the organization communicate and operate. Schein (2010) refers to these are "artifacts". It should be noted that the visible depictions at this level cannot be equated with conclusions regarding the other levels in Schein's model (values, beliefs, attitudes, and underlying assumptions) unless there is further analysis of the culture of an organization (Schein, 2010).

The second level of Schein's model includes the values, beliefs and attitudes of the group of individuals that comprise the workforce of an organization (Bitsani, 2013; Hogan & Coote, 2014; Schein, 2010). While values, beliefs and attitudes are not as readily observable as the behaviors and tangible artifacts in the first level, they can be measured. This second level of the model is most closely linked to understanding effective and ineffective performance in an organization. According to Schein (2010), if the observed values, beliefs, and attitudes of those within the organization align with the expected values, beliefs, and attitudes of the organization, then performance will be effective. If, however, there is not alignment or agreement between what is expected and what is observed at this level, the organization will not perform effectively.

The third and deepest level of Schein's model of organizational culture represents the true character or essence of an organization and is comprised of the underlying assumptions held by the individuals within an organization (Bitsani, 2013; Hogan & Coote, 2014; Schein, 2010). These assumptions are what the individuals in an

organization assume to be true, what is taken for granted, and what guides behavior and decision-making. These assumptions within an organization are difficult to alter or change as individuals will perceive alternative assumptions as unacceptable. This level of the true culture of an organization represents the mindset or what is comfortable and accepted. These assumptions are characterized as being unconscious, intangible, and not readily measurable, and are at the core of what guides individuals, their behaviors, and their beliefs within an organization.

Schein's model is used for this study by proposing that national accreditation standards set performance expectations for local health departments. Successfully achieving accreditation status indicates that the local health department has demonstrated the necessary structures, processes, and behaviors or "artifacts" of a specific organizational culture which operates at a level meeting national accreditation standards and aligning with the first level of Schein's model. The required documentation necessary for a local health department that has been designated as accredited is the set of "artifacts" that are tangible and observable in meeting process related national standards. The individuals within a local health department can demonstrate to an observer (i.e. site visitor) that they meet or ascribe to these standards or not. Where development of structure and processes are new, accreditation drives organizational change and culture in improving performance to meet national benchmarks in an observable manner. Accreditation standards are thus a driver of changing organizational culture at the first level of Schein's model in terms of the behaviors, processes, and structures or "artifacts" needed for a high performing health department. What is not known is whether meeting the national accreditation standards, having the behaviors, processes, and structures in

place, translates into improvements or differences in health outcomes between accredited health departments as compared to unaccredited. This study will not focus on the second and third levels of Schein's model, including the perceptions of health department staff or the community, nor the intangible mindset of the individuals in health departments.

Summary of the Review of Literature

Local health departments vary by numerous characteristics, including population size, rurality, agency type, governance authority, financing, and the services and programs offered. The first-ever national, voluntary public health accreditation program was established in 2011 as a way to assure a standard set of services and an optimal level of performance are available to populations in all communities. Similar to other fields such as health care that ascribe to accreditation, the concepts of quality and performance are foundational to public health accreditation. While early research has been conducted regarding factors influencing accreditation and the process of becoming accredited, similar to health care, no studies exist on the effectiveness of public health accreditation and since its inception no studies have examined whether population health outcomes are improved in public health jurisdictions served by accredited local health departments. Such a study would also require the identification of a standard set of indicators, taking into consideration the programs and services offered, as well as the 10 essential public health services that align with accreditation requirements.

Schein's (2010) theoretical model of organizational culture proposes there are three levels of culture in an organization, with only the first level being observable and tangible. Accreditation represents validation of an organization's culture through observable "artifacts", as demonstrated by performance and service delivery at this level.

When accreditation status is achieved, it is formal recognition that an organization is delivering public health services through the evident behaviors, processes, and structures of the organization, which have been measured against a set of nationally, recognized standards at the first level of Schein's model.

A gap in knowledge exists however, regarding the influence of accreditation on health outcomes and/or health status. This study contributed to that body of knowledge by examining the association of accreditation status and whether public health accreditation standards for access to care, communicable disease, disease prevention and health promotion, environmental health, and maternal and child health differ between accredited and nonaccredited local health departments. In addition, the study contributed by also examining whether health outcomes of life expectancy, chronic diseases, infectious diseases, and infant health differed in public health jurisdictions of accredited and nonaccredited local health departments.

Chapter 3: Methods

Introduction

No studies have been conducted to examine the effect of public health accreditation on health and whether health is better in jurisdictions where there are local health departments that have been recognized for their performance through national public health accreditation. This is largely due to the fact that the implementation of national voluntary public health accreditation in the United States occurred only in the past decade (PHAB, 2017a). In the field of public health, there is a general lack of empirical evidence pertaining to the identification of factors that enable local health departments to achieve accreditation successfully, what influence and impact accreditation has, and the availability of standardized indicators or tools that enable assessment of outcomes, including effectiveness, that occur as a result of achieving public health accreditation status (Beitsch et al., 2014; Riley et al., 2012). This study contributes to filling a gap in the evidence base by examining the possible correlation between accreditation and health indicators and outcomes for accredited versus nonaccredited local health departments. If a correlation exists, it will demonstrate the first measurable health-related outcomes of being accredited to state, local, tribal, and territorial health departments; the public; elected officials; the accrediting body (PHAB); funders; and academicians. To determine if a correlation exists, a quantitative strategy of inquiry was used to answer the research questions. The resulting data were analyzed to determine if the variables were correlated. The research design and rationale for this study are detailed in this chapter. In this chapter, I also describe the methodology for the study, including the study population, sampling and sampling procedures, data access,

instrumentation and operationalization of constructs, the data analysis plan, and threats to validity and ethical procedures.

Research Design and Rationale

Study Variables

The independent variable for this study was accreditation status (an indicator of organizational performance), where local health departments used in the sample were accredited or not accredited. The dependent variables (which could be influenced by accreditation) are included in Tables 2 to 7, which reflect all variables included in the study. The variable, variable type, and data source is provided for each. There were no mediating or moderating variables for this study.

Table 2

Demographic Variables of Local Health Departments as the Unit of Study

Demographic variables	Type of variable	Data source
Population size	Dependent, ordinal	U.S. Census Bureau
Rurality	Dependent, dichotomous	U.S. Census Bureau
Agency type	Dependent, nominal	CDC
Governance authority	Dependent, dichotomous	CDC

Table 3

Communicable Disease Variables, Type, and Data Sources

Communicable disease variables	Type of variable	Data source
Newly diagnosed chlamydia cases per 100,000	Dependent, continuous	National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP) AtlasPlus
Persons 13 years and older living with a diagnosis of HIV infection per 100,000 population	Dependent, continuous	CDC NCHHSTP AtlasPlus

Table 4

Disease Prevention and Health Promotion (DP/HP) Variables, Type, and Data Sources

DP/HP variables	Type of variable	Data source
Percentage of adults with self-reported fair or poor health	Dependent, continuous	Behavioral Risk Factor Surveillance System (BRFSS)
Body mass index (BMI) > 30 among adults 20 and older	Dependent, continuous	CDC Diabetes Interactive Atlas
Percentage of adults currently smoking	Dependent, continuous	BRFSS
Percentage of adults age 20 and over reporting no leisure-time physical activity	Dependent, continuous	CDC Diabetes Interactive Atlas

Table 5

Maternal Child Health (MCH) Variables, Type, and Data Sources

MCH variables	Type of variable	Data source
Teen birth rate (number of births per 1,000 female population aged 15-19 years)	Dependent, continuous	National Center for Health Statistics—Natality files
Low birth weight rate (percentage of live births with low birthweight < 2,500 grams)	Dependent, continuous	State vital statistics reports

Table 6

Health Outcomes Variables, Type, and Data Sources

Health outcome variables	Type of variable	Data source
Premature death (years of potential life lost before age 75 per 100,000 population)	Dependent, continuous	National Center for Health Statistics—Natality files
Infant mortality (number of all infant deaths within 1 year per 1,000 live births)	Dependent, continuous	State vital statistics reports

Design and Rationale

The research design used for this study was the historical prospective quasi-experimental, nonequivalent group design (NEGD), one of the most frequently used designs in behavioral and social research. The NEGD study design was used to examine voluntary public health accreditation as an intervention or "incident" between accredited and nonaccredited local health departments, as "intact" groups, to answer the research

questions. One threat with the use of the NEGD was selection differences that can bias the treatment effects, subsequently causing incorrect conclusions to be drawn from a study; thus, it was important to select groups that were as similar as possible in order to be comparable. This study was strengthened by use of the NEGD, with a control group, where nonaccredited and accredited local health departments were matched as closely as possible, from the population of each group (intervention and control groups), on the following characteristics, which are known to vary widely among public health agencies: a) population size, b) rurality, c) agency type, and d) governance authority (NACCHO, 2014; U.S. Census Bureau, 2016a; 2016b). There was no random assignment to groups for this study, as local health departments were "pregrouped" upon deciding to pursue accreditation and successfully achieve accreditation designation. Accredited local health departments comprised the intervention (or incident) group, and nonaccredited local health departments comprised the control group for this study. Thus, the purpose of this historical prospective quasi-experimental (nonequivalent group design) study was to explore the relationship between accreditation designation of local health departments and health factors and outcomes. I did not identify any time or resource constraints arising from this study design. The historical prospective NEGD study design was used to identify whether accreditation was associated with a change in health-related outcomes in the jurisdictions served by local health departments to advance knowledge about accreditation in the field of public health.

Methodology

Population

The target population for this study was accredited and nonaccredited local health departments in the United States. The study did not include state departments of health, tribal departments of health, or territorial health departments in the United States.

Sampling and Sampling Procedures

The sample of accredited local health departments for the intervention group included the entire population of 212 local health departments, located in 38 states, accredited by the PHAB during the period of September 2012 (accreditation program inception) through December 2017. The population of nonaccredited local health departments was obtained from the NACCHO. To reduce selection bias, each accredited local health department was matched with a nonaccredited local health department based on a demographic profile that consisted of the following five characteristics to comprise the study sample: a) population size, b) rurality, c) agency type, d) governance authority, and e) state public health structure. First, local health departments were matched by the population size of their public health jurisdiction using the following categories: less than 50,000; 50,000 to 499,999; and 500,000 or more (NACCHO, 2014). Second, they were matched on the characteristic of rurality, defined as not being designated as an urban area (Ratcliffe, Burd, Holder, & Fields, 2016). Third, local health departments were matched on the characteristic of agency type, including county-based, city-based, city–county, or multicounty jurisdiction (NACCHO, 2014). Finally, local health departments were matched on the characteristic of governance authority as being local board governed or part of a centralized state agency and were matched to the public health structure of the

state (centralized, decentralized, or mixed; NACCHO, 2014). The research questions then used secondary data in terms of preselected variables consisting of a set of credible public health indicators that were publicly available.

Inclusion and exclusion criterion for this study were established to control for possible confounding variables during data collection. There were two inclusion criteria for the intervention group of accredited local health departments in this study. First, all governmental local health departments included in this study were located in the 50 states; this category encompassed health departments in county and city–county public health jurisdictions. Second, all local health departments included in the intervention group for this study had been accredited by the PHAB during the study period of September 2012 through December 2017. Exclusion criteria for the intervention group included the following: a) tribal health departments; b) local health departments located in the U.S. territories, and c) all local health departments not accredited as of December 31, 2017. The rationale for the exclusion of U.S. territorial and tribal local health departments was that there were different measures and documentation required by the PHAB for these health departments, as compared to governmental local health departments in Version 1.5 of the national voluntary public health standards (PHAB, 2016a).

Inclusion criteria for the control group included local health departments (a) not accredited by PHAB as of December 31, 2017 and (b) with the same "demographic profile" as previously defined by the five parameters for case matching. Each local health department in the control group was matched to an intervention group "case" health department based on their "demographic profile" so that there was a one-to-one match of

accredited and nonaccredited local health departments in the intervention and control groups, respectively. Exclusion criteria for the control group included accreditation by PHAB prior to December 31, 2017.

To determine the sample size needed, G*Power 3.1 power analysis software was used. G*Power 3.1 is a power analysis program that is widely used in behavioral, social, and biomedical research with many statistical tests; it is available on most computer platforms (Dattalo, 2008). More specifically, G*Power 3.1 assesses statistical power in five different ways: a priori analyses, post hoc analyses, compromise power analyses, sensitivity analyses, and criterion analyses. G*Power analyses include, but are not limited to, logistic regression, multiple linear regression, and correlation. In addition, the software allows selection of a distribution-based approach or design-based approach to analysis. Using G*Power 3.1, an a priori sample size analysis was calculated for a multiple regression for a medium effect size (0.15), a 0.05 α error probability, and 0.95 power, with a minimum sample size of 107 local health departments per group needed for the study. With a 0.05 error of probability and 0.95 power, and small effect size, a sample size of 258 local health departments per group was determined to be needed. The sample size for this study was a minimum of 107 for a medium effect using the G*Power results. The total number of accredited health departments during the project period of September 2011 to December 2017 was 212, and the entire population of accredited local health departments was used for this study.

Access to Data

All data used were secondary data, collected retrospectively from publicly available sources. Although no primary data collection was required for this study,

additional time was necessary for the collection, preparation, coding, and analysis of secondary data from the multiple data sources used for this study. All data were stored in a Microsoft Excel 2016 spreadsheet, were backed up, and were cleaned prior to analysis.

Data Analysis Plan

This study used publicly available secondary data, which were originally collected for other purposes but were used as individual indicators for this study. The data source for each indicator was defined in Tables 3 through 6. Analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 24.0. The unit of analysis was the local health department. The first research question required the collection of data using selected variables for communicable disease, disease prevention and health promotion, and maternal and child health, each of which is defined in Tables 3 through 5. The second research question required collection of data using selected variables for premature death and infant mortality. Descriptive statistics were used and individual regression models constructed for each dependent variable. In all models, the independent variable was accreditation status. In answering the research questions, I sought to advance knowledge concerning whether accreditation may be linked to health factors and outcomes.

Research Questions and Hypotheses

The research questions for this study were as follows:

RQ1: Do health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI $\geq$ 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and

low birth weight differ between accredited and nonaccredited local health departments?

$H_0$1: There is no statistically significant difference ($p < 0.05$) in health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI > 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and low birth weight between accredited and nonaccredited local health departments.

$H_1$1: There is a statistically significant difference ($p < 0.05$) in health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI > 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and low birth weight between accredited and nonaccredited local health departments.

RQ2: Do health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) differ in public health jurisdictions between accredited and nonaccredited local health departments?

$H_0$2: There is no statistically significant difference ($p < 0.01$) in health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) in public

health jurisdictions between accredited and nonaccredited local health departments.

$H_1 2$: There is a statistically significant difference ($p < 0.01$) in health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) in public health jurisdictions between accredited and nonaccredited local health departments.

Threats to Validity

This study used secondary data and there are few threats to external validity that could have influenced or affected the generalizability of the study based on the findings. The primary threat to validity was the potential for selection bias or selection differences that could have biased the treatment effects and caused incorrect conclusions to be drawn from the study. To address this, a matched control group and intervention group were included in the study design, based on characteristics as detailed in this chapter. As no primary data collection was used for this study, only publicly available secondary data, there were no significant threats to internal validity identified.

Ethical Procedures

As this study consisted of secondary deidentified data analysis of local health department agencies, and the use of publicly available data, no active recruitment of individual participants was conducted, no protected public health information collected, and no individual written informed consent for participation were required. However, Institutional Review Board (IRB) approval was obtained (approval number is 08-07-18-

0143724) through Walden University prior to commencement of the study. All data and documents were stored on a hard drive of a computer owned by this researcher. All data and documents prepared for this study were backed up on a flash drive and maintained in a secure and locked cabinet. In accordance with accepted IRB guidelines, the publicly available data used for this study will be maintained in a secure, locked location for a minimum of three years or indefinitely. I receive annual training on the conduct of research through the Collaborative Institutional Training Initiative (CITI) on Responsible Conduct of Research and Human Subjects Research and that training and certification is current.

Summary

In summary, a historical prospective quasi-experimental (non-equivalent group design) study was conducted to explore the relationship between accreditation designation of local health departments and health factors and outcomes. The population studied was non-tribal, non-territorial, county and city-county local health departments in the United States. The potential for selection bias was addressed by use of a control group and intervention group and matching conducted on characteristics of population size, rurality, agency type, and governmental authority. All data were collected using publicly available secondary data from multiple sources, stored in Excel 2016, and analyzed using SPSS. Chapter 4 includes a summary of the data collected and data analysis results.

Chapter 4: Results

Introduction

The purpose of this quantitative secondary data analysis was to investigate whether there was an association between accreditation status of local health departments (accredited or nonaccredited) and health indicators and outcomes selected for this study with statistical significance established at < 0.05. Specific health indicators studied as dependent variables included two communicable disease indicators of *Chlamydia trachomatis* infection incidence (number of newly diagnosed cases per 100,000 population per year) and HIV infection prevalence (number of people aged 13 years and older living with a diagnosis of HIV infection per 100,000 population per year). Health indicators included as dependent variables for disease prevention and health promotion were health status (percentage of adults with self-reported fair or poor health), BMI ≥ 30 among adults 20 and older, smoking (percentage of adults currently smoking), physical inactivity (percentage of adults age 20 and over reporting no leisure-time physical activity), and diabetes prevalence (percentage of adults aged 20 and older with diagnosed diabetes). Maternal child health indicators assessed as dependent variables included teen birth rate (number of births per 1,000 female population aged 15-19 years) and low birth weight (percentage of live births with low birthweight < 2,500 grams). Health outcomes also assessed as dependent variables in this study included premature death, defined as the years of potential life lost before age 75 per 100,000 population, and infant mortality rate, defined as the number of all infant deaths within 1 year per 1,000 live births.

Research Questions and Hypotheses

RQ1: Do health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI ≥ 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and low birth weight differ between accredited and nonaccredited local health departments?

$H_0$1: There is no statistically significant difference ($p < 0.05$) in health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI > 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and low birth weight between accredited and nonaccredited local health departments.

$H_1$1: There is a statistically significant difference ($p < 0.05$) in health indicators of *Chlamydia trachomatis* infection incidence, HIV infection prevalence, health status (poor or fair), BMI > 30, smoking prevalence, physical inactivity, diabetes prevalence, teen birth rate, and low birth weight between accredited and nonaccredited local health departments.

RQ2: Do health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) differ in public health jurisdictions between accredited and nonaccredited local health departments?

$H_0$2: There is no statistically significant difference ($p < 0.05$) in health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) in public health jurisdictions between accredited and nonaccredited local health departments.

$H_1$2: There is a statistically significant difference ($p < 0.05$) in health outcomes of premature death (years of potential life lost before age 75 per 100,000 population) and infant mortality rate (the number of all infant deaths within 1 year per 1,000 live births) in public health jurisdictions between accredited and nonaccredited local health departments.

This chapter presents a summary of data collection, discrepancies from the initial plan, baseline descriptive and demographic characteristics, sample representativeness, statistical assumptions, reporting of statistical analysis findings, and a chapter summary.

Data Collection

The study sample included 121 accredited (intervention) local health departments and 121 nonaccredited (control) local health departments. Prior to data collection of health indicators and health outcomes, each accredited local health department was matched with a nonaccredited local health department on a specific set of characteristics so that the two groups (intervention and control groups) were as similar as possible in order to be comparable. Accredited and nonaccredited health departments were matched on the following criteria: a) population size (less than 50,000; 50,000 to 499,999; and

500,000 or more); b) rurality (population of 50,000 or less designated as rural); c) local health department agency type (county, city–county); and d) governance authority (centralized, decentralized, or shared/mixed model).

All data were collected for each indicator and outcome using the sources identified in Chapter 3, and data were entered individually for each accredited and nonaccredited health department in the sample in a Microsoft Excel spreadsheet. All data were evaluated for missing or mis-entered data entry. For any missing data, a zero was entered, and as individual regression models were developed for each health indicator or outcome, this case (health department) was not included in the statistical analysis for that particular indicator or outcome unless data were developed for both cases in the matched pair of the accredited and nonaccredited health departments. After all data were cleaned, and prior to analysis, a new column was added for data analysis for the independent variable (i.e., a dummy variable was formed). This dummy variable included binomial responses, with "0" for nonaccredited cases and "1" for accredited cases. Once the dummy variable was established, the data were imported into SPSS 25.0 software for analysis. Data analyses were performed, including frequency and descriptive analyses, and linear regression models were constructed for each health indicator and each health outcome as dependent variables.

The initial study plan was to include county, city–county, city, and regional local health departments and exclude tribal and territorial local health departments because tribal and territorial health departments have a different set of PHAB standards. As public health jurisdiction data for the selected health indicators and outcomes were not found to exist for city health departments and regional health departments, these were added to the

exclusion criteria and may represent important areas of future study due to their unique organizational nature. There were no other deviations from the initial study plan. The final sample included matched county and city–county health department jurisdictions.

Descriptive Summary of Study Population

Between September 2012 and December 2017, the initial sample size for the intervention group was 212 accredited local health departments located in the continental United States. Intervention (accredited) agencies were matched with control (nonaccredited) agencies on the criteria of population size, rurality, agency type, and governance authority. A total of 91 cases (accredited health departments) met exclusion criteria (being a state, tribal, territorial, city, or regional local health department) and were not matched or included in the study sample. The final sample size of accredited health departments (county or city–county) matched with nonaccredited health departments on the established criteria was 121.

The descriptive statistics presented in Table 7 provide an overall picture of demographic characteristics for the accredited (intervention) local health departments, including population size, rurality, agency type, and governance authority. The majority (67.8%, $n = 82$) in this cohort of local health departments accredited from September 2012 to December 2017 were located in public health jurisdictions with population size of 50,000 to 499,999, with only 9.1% ($n = 11$) being located in jurisdictions with population size less than 50,000 (considered rural) and 23.1% ($n = 28$) in jurisdictions with population size of 500,000 or more. In terms of sample representativeness, a majority (90.9%) of accredited local health departments in the cohort were located in nonrural counties with population greater than 50,000. Similarly, a majority of the

sample (87.8% [*n* = 105]) were county health departments, and only 13.2% (*n* = 16) were city–county local departments. A much lower percentage of accredited local health departments in this study (9.1%) were located in rural counties (population less than 50,000) as compared to the proportion of counties for the U.S. overall (68.5%).

The descriptive statistics presented in Table 7 provide the demographic characteristics for the accredited and nonaccredited local health departments based on the matching criteria of population size, rurality, agency type, and governance authority, demonstrating the comparability of the matched samples for the intervention and control groups.

Table 7

Descriptive Summary of Matched Accredited (N_A= 121) and Nonaccredited (N_{NA}=121) Local Health Departments by Demographic Variables (Matching Criteria)

		Accredited		Nonaccredited	
Factor	Subfactor	Frequency	Percent	Frequency	Percent
Population	Less than 50,000	11	9.1%	11	9.1%
	50,000–499,999	82	67.8%	82	67.8%
	500,000 or more	28	23.1%	28	23.1%
Rurality	Rural	11	9.1%	11	9.1%
	Nonrural	110	90.9%	110	90.9%
Agency type	County	105	87.8%	105	87.8%
	City/County	16	13.2%	16	13.2%
Governance authority	Centralized	2	1.7%	2	1.7%
	Decentralized	103	85.1%	103	85.1%
	Shared	16	13.2%	16	13.2%

A total of 85.1% of local health departments were located in states with decentralized public health authority (defined in Chapter 3), as compared to 13.2%

located in states with shared authority between state and local agencies and 1.7% in states with a centralized public health authority structure. In the United States, local health departments in 27 states (54%) operate under a decentralized structure, five (10%) states operate under a centralized structure, and 18 (36%) operate under some degree of a mixed or shared governance structure (CDC, 2018). The majority (85.1%) of accredited local health departments in the study were located in decentralized states as compared to 54% of all local health departments located in decentralized states. Furthermore, only 13.2% of accredited health departments in the sample were located in states with shared authority, even though such states represent 36% of all states. Finally, while 10% of all local health departments in the United States. are located in states with a centralized public health structure, only 1.7% of the sample of local health departments in this study were from jurisdictions with this structure. In that public health accreditation through PHAB is a voluntary process and this sample included the population of all county and city–county local health departments accredited during the study period, it was not possible to control sample representativeness.

Results

In order to determine whether accreditation, as an independent variable, had an effect on each of the selected dependent variables for this study, individual linear regression models were developed for analysis of the data. In each model, a dummy variable was created for the independent variable of accreditation where 0 represented nonaccredited and 1 represented accredited status for each case in the sample. Linear regression was appropriate for analysis because it fulfilled all of the necessary assumptions for the test when a dummy variable is used. These include having a

continuous dependent variable and independent variable(s) that are continuous or discrete. For this study, all dependent variables were continuous in nature, and the independent variable was discrete and dichotomous, being nonaccredited (0) or accredited (1). Assumptions were made that all secondary data used for the study were measured in an unbiased and accurate manner as reported and were normally distributed. As each case (local health department) could only be accredited once, it was concluded that the independence of observation assumption was met for this test. In addition, the dependent variables were mutually exclusive as a local health department cannot be both accredited and nonaccredited at the same time. The acceptable alpha or Type-I error limit was preset at 0.05, such that p-values of < 0.05 would be considered statistically significant as they would cause rejection of the null hypothesis of no difference.

Health Indicators

To address the first research question, linear regression models were used to determine if there was a statistically significant difference between accredited and nonaccredited health departments for each health indicator for communicable disease (*Chlamydia trachomatis* infection and HIV infection), disease prevention and health promotion (health status, BMI ≥ 30, smoking status, physical activity, and diabetes), and maternal child health (teen birth rate and percentage of low birth weight) as the dependent variables. It also enabled determination of the direction of the differences found via the slope of the regression line being in the positive or negative direction.

Communicable disease. A simple linear regression was first calculated to predict *Chlamydia trachomatis* incidence infection rates based on accreditation status.

The Pearson's correlation coefficient for was -0.057 with a negative slope ($F(1,240) = 0.784$, $p = 0.377$) and R^2 of .003 (0.3% of the variation can be explained by the model). The *Chlamydia trachomatis* rate was equal to 433.555 - 19.768 when accreditation was measured by accreditation status (accredited or nonaccredited) such that the *Chlamydia trachomatis* incidence rate was 433.6 per 100,000 in the public health jurisdictions of health departments that were nonaccredited as compared to 413.8 per 100,000 in the jurisdictions of health departments that were accredited. The *Chlamydia trachomatis* rate was decreased by 19.768 per 100,000 in jurisdictions with accredited health departments.

When simple linear regression was carried out for communicable disease to predict prevalence of HIV infection based on accreditation status, the Pearson's correlation coefficient was -0.079 with a negative slope and equal to 213.500 - 28.857. The slope coefficient for HIV was -28.857 with a negative slope, and the R^2 value was 0.006 with only 0.6% of the variation explained by the model containing only accreditation status as a dichotomous independent variable. HIV infection was not observed to be a significant predictive independent variable ($F(1,238) = 1.485$, $p = 0.224$), with an R^2 of .006. The HIV rate was 213.5 per 100,000 in the public health jurisdictions of nonaccredited health department as compared to 184.6 per 100,000 in jurisdictions of accredited health departments.

Disease prevention and health promotion. Regression was then used to determine if there was a statistically significant difference in health indicators for disease prevention and health promotion indicators of health status (fair or poor health), BMI greater than 30 among adults, smoking among adults, physical inactivity, and diabetes.

First, a simple linear regression was performed for health status. The Pearson's correlation coefficient was -0.192 with a negative slope. Health status was observed to be a significant predictive independent variable ($F(1,240) = 9.202$, $p = 0.003$), with an R^2 of .037 ($p < 0.05$). Health status (fair or poor health) was equal to 17.025 - 2.231 when accreditation was measured by accreditation status. Perceived health status (fair or poor) was 17.025% in nonaccredited health department jurisdictions as compared to 14.794% among the population in accredited health department jurisdictions. The percentage of the population with fair or poor health was significantly lower at a significance level of 0.05 in jurisdictions with accredited health departments. The slope coefficient for health status was -2.231 with a negative slope, and the R^2 value was 0.037, indicating that only 3.7% of variation is explained by the model containing only accreditation status as a dichotomous independent variable.

A simple linear regression was then calculated to predict BMI ≥ 30 based on accreditation status. The Pearson's correlation coefficient of -.020 with a negative slope and BMI was not observed to be a significant independent or predictive variable ($F(1,240) = 0.97$, $p = 0.755$), with an R^2 of < .001. The health factor of percentage of adults with BMI ≥ 30 was equal to 28.860 – 0.182 when accreditation was measured by accredited health status. The BMI ≥ 30 rate was 28.860 per 100,000 in jurisdictions of nonaccredited health departments compared to 28.678 per 100,000 in jurisdictions of accredited health departments. The slope coefficient for BMI was -0.182 with a negative slope, and the R^2 value was < 0.01, and 0% of variation can be explained by the model containing only accreditation status as a dichotomous independent variable.

A simple linear regression was then calculated to predict smoking based on accreditation status. The Pearson's correlation coefficient of -0.154 with a negative slope. Smoking was observed to be a significant predictive independent variable ($F(1,240) = 5.857$, $p = 0.016$, with an R^2 of .024 ($p < 0.05$). The percentage of adults currently smoking in nonaccredited health department jurisdictions was 17.14 per 100,000 compared to 16.0 in jurisdictions of accredited health departments. The health indicator of the percentage of adults smoking is equal to 17.140 - 1.140 when accreditation is measured by accreditation status. The percentage of adults smoking is significantly lower in jurisdictions with accredited health departments. The slope coefficient for smoking is negative (-1.140) and the R^2 value is .024, and 2.4% of variation is explained by the model containing only accreditation status as a dichotomous independent variable.

A simple linear regression was calculated to predict physical inactivity based on accreditation status. The Pearson's correlation coefficient of -.176 with a negative slope. Physical inactivity was observed to be significantly predictive ($p<0.05$). The indictor of physical inactivity is equal to 23.438 - 1.785 when accreditation is measured by variable ($F(1,240) = 7.692$, $p = 0.006$, with an R^2 of .031 ($p < 0.001$) accreditation status. The percentage of physical inactivity is lower in jurisdictions with accredited health departments. The percentage of adults age 20 and over reporting no leisure-time physical activity was 23.4% in the jurisdictions of nonaccredited health departments compared to 22.7% in jurisdictions of accredited health departments. The slope coefficient for physical inactivity is 1.785 and the R^2 value is .031, and 3.1% of the variation can be explained by the model containing only accreditation status as a dichotomous independent variable.

Finally, a simple linear regression was calculated to predict the health indicator of diabetes based on accreditation status. The Pearson's correlation coefficient of -0.160 demonstrated a negative slope and diabetes was observed to be a significant independent variable ($F(1,240) = 6.304$, $p = 0.013$, with an R^2 of .026 ($p < 0.05$). The health factor of diabetes is equal to 10.397 - 0.736 when accreditation is measured by accreditation status. The percentage of adults aged 20 and above with diagnosed diabetes was 10.4% in jurisdictions of nonaccredited health departments compared to 9.7% in jurisdictions of accredited health departments. The slope coefficient for diabetes was 0.736 and the R^2 value is .026, with 2.6% of the variation explained by the model containing only accreditation status as a dichotomous independent variable.

Maternal child health. The final statistical analysis conducted to answer the first research question required using linear regression to predict the maternal child health factors of teen births and low birth weight. For teen births the Pearson's correlation coefficient was -1.91 with a negative slope. Teen births was observed to be a significant independent variable ($F(1,240) = 9.040$, $p = 0.003$, with an R^2 of .036 ($p < 0.05$). The health factor of teen birth rate was equal to 28.157 - 4.620 when accreditation is measured by accredited status and the teen birth rate (number of births per 1,000 females aged 15-19) was 28.16 per 100,000 in jurisdictions of nonaccredited health departments compared to 23.54 per 100,000 in jurisdictions of accredited health departments. For low birth weight, the Pearson's correlation coefficient of -0.126 with a negative slope. No significant equation was found ($F(1,240) = 3.887$, $p = 0.05$, with an R^2 of .016 ($p < 0.05$). The health factor of low birth weight is equal to 7.744 - 0.355 when accreditation is measured by accredited status. The low birth weight rate was 7.74 per 100,000 in

jurisdictions of nonaccredited health departments compared to 7.39 per 100,000 in jurisdictions of accredited health departments.

Table 8

Summary of Simple Linear Regression for Health Indicators for Communicable Disease, Disease Prevention and Health Promotion, and Maternal Child Health

Health factors	*B*	*SE B*	*β*	*t*	*p*
Communicable disease					
Chlamydia	-19.768	22.324	-0.57	-0.885	.377
HIV	-28.857	23.676	-0.79	-1.219	.224
Health promotion					
Health status	-2.231	.736	-.192	-3.033	.003
BMI, adults, $\geq$ 30	-0.182	.583	-.020	-.312	.755
Smoking, adults	-1.140	.471	-.154	-2.420	.016
Physical inactivity	-1.785	.644	-.176	-2.773	.006
Diabetes	-0.736	.293	-.160	-2.511	-.013
Maternal child health					
Teen births	-4.620	1.536	-.191	-3.008	.003
Percentage low weight	-0.355	.180	-.126	-1.971	.050

Health Outcomes

To address the second research question, linear regression models were used to determine if there was a statistically significant difference in health outcomes for premature death and infant mortality between jurisdictions served by accredited and nonaccredited local health departments.

Premature death. A simple linear regression was calculated to predict premature death based on accreditation status. The Pearson's correlation coefficient of -.132 with a negative slope. Premature death was observed to be a significant independent variable ($F(1,240) = 4.273$, $p = 0.040$, with an R^2 of .017 ($p < 0.05$). The health promotion factor of premature death rate was equal to 7,023.967 – 479.339 when accreditation was

measured by accreditation status. The premature death rate was 7,023.96 per 100,000 in jurisdictions of nonaccredited health departments compared to 6,544.62 per 100,000 in jurisdictions of accredited health departments.

Infant mortality. A simple linear regression was then calculated to predict infant mortality based on accreditation status. The Pearson's correlation coefficient of -.068 with a negative slope. The independent variable of infant mortality was not significant ($F(1,212) = 4.273$, $p = 0.325$, with an R^2 of .005. The health outcome factor of infant mortality rate was equal to 6,000 + -0.234 when accreditation was measured by accreditation status. Infant mortality was 0.234 lower in jurisdictions with accredited health departments.

Table 9

Summary of Simple Linear Regression Models for Health Outcomes

Health outcomes	*B*	*SE B*	*β*	*t*	*p*
Premature death	-479.339	231.886	-.132	-2.067	.040
Infant mortality	-.234	.237	-.068	-.986	.325

Sign Test

The slope coefficients for all 11 indicators used in this research were found to be negative and, as determined by a 1-tailed sign test this was significant ($p = 0.0005$). These 11 health indicators were consistently more positive (from a public health perspective) for accredited local health departments than for matched nonaccredited local health departments.

Summary

The results of the descriptive analysis reveal that the matched samples of

accredited and nonaccredited local health departments were similar with regard to population size, rurality, local health department agency type, and type of governance authority of the agency. The majority of local health departments in the sample (85%) were from states with decentralized public health systems. The majority of accredited local health departments (90.1%) served jurisdictions with populations of 50,000 or more.

To answer the first research question there was no statistically significant difference in health indicators for communicable disease *(Chlamydia trachomatis* infection and HIV infection), for the disease prevention and health promotion indicator of BMI $\geq$ 30 between accredited and nonaccredited local health departments, and for the maternal child health indicator of low birth weight. However, there was a statistically significant difference and the null hypothesis was rejected for disease prevention and health promotion indicators of self-reported fair or poor health status, percentage of adults smoking, physical inactivity and percentage of the population with diabetes and the maternal child health indicator of teen birth rate between accredited and nonaccredited local health departments. To answer the second research question, there was a statistically significant difference and the null hypothesis was rejected for the health outcome of premature death. For the health outcome indictor of infant mortality there was no statistically significant difference between accredited and nonaccredited health departments.

For health factors where a statistically significant difference was not found, differences (lower) were observed for each of the health factors (Chlamydia, HIV, BMI, low birthweight) and health outcome models (infant mortality). When the sign test was performed it was significant that all 11 indicators showed that the accredited local health

departments had more positive public health outcomes than nonaccredited ($p = 0.0005$).

Interpretation of the results and further discussion of the study findings will be presented in Chapter 5. In addition, limitations of the study, recommendations for future research, and social change implications will be discussed in detail.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The goal of voluntary public health accreditation is to promote and protect the public's health through optimal organizational performance. To be designated as accredited, local health departments must demonstrate specific areas of organizational performance, such as disease surveillance and investigation, community-based health promotion and education, enforcement and regulation of public health laws, and use of performance management and quality improvement (PHAB, 2016a). As a result of the recent implementation of public health accreditation, a knowledge gap exists regarding the influence of local health department accreditation on health factors and health outcomes in the populations that local health departments serve (Beitsch et al., 2014; Riley et al., 2012).

The purpose of this quantitative secondary data analysis was to investigate whether achieving voluntary national public health accreditation status as a local health department is associated with improved health factors and/or health outcomes, and if so, what health factors and/or outcomes are predicted by accreditation. The study aimed to answer two research questions:

1. Do health indicators for communicable disease, health promotion, and maternal child health differ in public health jurisdictions of accredited and nonaccredited local health departments?
2. Do health outcomes of premature death and infant health (deaths under 1 year of age) differ in public health jurisdictions of accredited and nonaccredited local health departments?

Accredited local health departments were matched with nonaccredited local health departments based on population size, rurality, agency type, and type of governance authority. Two communicable disease indicators (*Chlamydia trachomatis* infection and HIV infection), five health promotion indicators (health status, BMI, smoking, physical inactivity, and diabetes), two maternal child health indicators (teen births and low birth weight), and two health outcome indicators of premature death and infant mortality were studied. Research questions were assessed using individual linear regression models for each health factor and health outcome. In this chapter, I discuss the interpretation of findings, limitations, recommendations, and implications of the study.

Interpretation of Findings

Based on the analyses performed for this study, it can be concluded that local health department accreditation, as an independent variable, has been shown to be negatively associated (a positive finding) for all of the indicators and outcomes assessed for this study among the study population of local health departments accredited between September 2012 and November 2016. Three types of health factors were studied: indicators for communicable disease, health promotion, and maternal/child health. Based upon this summation, six out of 11 were found to be statistically significantly different. The remaining five were found to be statistically similar. When the sign test was performed, it was significant that for all 11 indicators, the accredited local health departments had more positive public health outcomes than nonaccredited local health departments ($p = 0.0005$).

In summary, there was an association between accreditation and five of the nine

health factors and one of the two health outcomes when assessed using linear regression and the sign test. An important additional finding was that all 11 indicators (nine health factors and two health outcomes) were found to be positive in terms of direction from a public health perspective, and all 11 were consistently in the jurisdictions of accredited local health departments. This is the first study to demonstrate that accreditation is positively associated with health factors and health outcomes among the populations that local health departments serve. No previous studies have been conducted to examine the association between accreditation and health factors or outcomes.

Accreditation standards established by the PHAB were developed without relation to specific diseases, health factors, or health outcomes. They were developed with a focus on the performance and quality of processes, practices, and operations of agencies to support the delivery of high-quality services to their respective communities. The primary goal of the PHAB accreditation program is to promote and protect the public's health through optimal organizational performance (i.e., accreditation; Beitsch et al., 2014; PHAB, 2017c). Based on the findings of this study, health departments designated as meeting accreditation standards, indicating that they have been recognized for optimizing performance and quality in the delivery of public health services, are associated with potentially improved health indicators and outcomes due to accreditation as demonstrated for all 11 indicators used in this study.

The current landscape of the U.S. public health system is one where the budgets and capacity of local health departments have in general not been fully restored since the most recent recession in 2008-2009 and resources for local health departments to pursue accreditation are limited (U.S. Department of Health and Human Services IOM, 2012).

Furthermore, there is very little flexibility for local health departments to meet the unique needs of their communities, as budgets are driven and dictated in large part by the state and federal funding that they receive. Such funding is typically program or disease related and does not support accreditation-related activities.

Accreditation is a significant undertaking and investment for local health departments. The period of becoming accreditation ready requires allocation and commitment of resources and time (indirect accreditation costs), both of which constitute an investment of public resources and funding. The additional direct cost of becoming accredited by the PHAB is based on population size, with rates ranging from $12,780 for a population less than 50,000 to a range of $20,670 to $95,400 for populations larger than 50,000, where the exact cost is determined by population size (PHAB, 2019).

As a result of inadequate dedicated financial support and resources for local health departments to pursue accreditation, as well as the significant direct and indirect costs associated with accreditation, there is lack of incentive for local health departments to become accredited, and fewer than 1 in 10 local health departments have been designated by the PHAB as accredited (Heffernan, Kennedy, Siegfried, & Meit, 2018). Similarly, there has not been great attention given to public health accreditation of local health departments by funders, elected officials, and other key stakeholders.

Based on health trends over the past three decades, leading causes of illness and death are attributed largely to individual behaviors such as eating patterns (i.e., weight), level of physical inactivity, and smoking; they are also driven by individuals' social determinants of health and the environment where they live (U.S. Department of Health and Human Services, 2016). In a systematic review of 52 studies that included return on

investment (ROI) or cost-benefit ratio for public health interventions in high-income countries, findings included that the median ROI for all public health interventions was 14.3 to 1 and that most public health interventions are associated with substantial cost savings (Masters, Anwar, Collins, Cookson, & Capewell, 2016).

Accredited health departments have met specific standards to be recognized as demonstrating a designated level of organizational performance. For example, accredited health departments have demonstrated that they can effectively collect and utilize data, conduct disease surveillance, promote health and education in the community, collaborate with community partners, utilize the best available evidence-based practices, and continually build a competent public health workforce. This study provides evidence that such performance and delivery of services and public health interventions by accredited health departments are associated with potentially improved health for assessed factors. As most public health interventions are associated with substantial cost savings, and as accredited local health departments that provide public health interventions are associated with potentially improved health for certain factors and outcomes as demonstrated in this study, the opportunity cost of accreditation is not simply the designation of status reflecting organizational performance. The benefit of public health accreditation is better health (for all assessed indicators and outcomes) in the communities that local health departments serve.

Limitations of the Study

The primary limitation of this study was that it did not have a prospective study design and there was no randomization to accredited or nonaccredited status, in that health departments were voluntarily accredited or nonaccredited. Although a

methodology of matching of accredited and nonaccredited health departments was used to strengthen the study design, no attribution of the "comparatively better" health factors and outcomes used in this study between the matched accredited and nonaccredited health departments could be determined. Future research be conducted to validate the results of this study, as well as to develop a prospective study design so such attribution can be addressed. However, study findings may help all health departments to increase their understanding of the manner in which accreditation could potentially influence the services they provide to the populations they serve. The matching methodology used to strengthen this study matched accredited and nonaccredited local health departments on specific parameters (population size, agency type, governance authority, and rurality), and data were collected from local health departments in multiple states, for public health jurisdictions of varying population size, and from health departments with varying governance structures. The study population included only accredited county and combined city/county health departments and did not include city or multijurisdictional health departments, or other types of health departments such as state, tribal, or territorial. The length of time that local health departments in the study population spent on collecting accreditation documentation, waiting for a site visit, or developing a corrective action plan after a site visit and prior to accreditation designation was also not taken into account and is an additional limitation that could not be controlled for. Finally, this study did not assess the relationship of community-based ratings (the perceptions of the community) of health department operations, performance, or services between accredited and nonaccredited health departments. Therefore, the findings from this study are not generalizable to all local health departments.

Recommendations

There are certain recommendations that can be pursued to better understand the effects and influence of accreditation on health indicators and health outcomes that were not considered in this study. First, additional studies are needed to a) validate the findings of this study, b) include baseline data so that the potential that the lower indices are attributable to accreditation can be assessed, and c) identify what other health indicators and health outcomes have an association with accreditation status, as this study addressed the association of an initial set of nine indicators and two outcomes. Second, additional studies are needed to identify what measures performed by accredited agencies contribute to improvements in health indicators and outcomes. The process of becoming an accredited health department requires meeting a set of standards organized by 12 domains. Within each of those 12 domains are specific measures (required activities) that set forth the performance expectations of an accredited health department. For example, conducting activities that engage community partners on health improvement activities or the community at large on health promotion and disease prevention, understanding and addressing health status and health inequalities (especially for those at risk of worse health outcomes) for the public health jurisdiction, conducting disease surveillance, and analyzing findings to develop evidence-based approaches for a public health response. Although this study established an association between accreditation status and improved (or a trend toward improved) health indicators and health outcomes, it did not identify what specific activities within health departments may have contributed to this finding (i.e., a more competent workforce, better performance on disease surveillance, more effective public education, the ability to collect and analyze community-level data, or the

ability to utilize performance management and quality improvement methodologies). As a result, additional inquiry is needed to understand what performance within a health department contributes to the association of accreditation and improved health indicators and outcomes. For health indicators and outcomes that did not demonstrate a significant association, the finding that some level of improvement was observed further supports the need for such additional inquiry, as all 11 of the health indicators and outcomes demonstrated some improvement, even if not statistically significant. It remains unclear "what" about accredited agencies contributes to the improved health indicators and outcomes.

Third, additional studies are needed to further test the influence of accreditation on public health jurisdictions with different characteristics, including population size, rural versus nonrural, and decentralized versus centralized and/or shared/mixed governance models. This study used a sample of local health departments that achieved voluntary public health accreditation between September 2012 and December 2016. The study sample was comprised primarily of local health departments serving populations of 50,000 to 499,999 (67.8%), with only 9.1% serving a population size of less than 50,000 and only 23.1% serving populations of 500,000 or more. Consequently, while an association between specific health indicators and outcomes was established, the study sample was comprised primarily of 67.8% medium-sized populations and 87.8% nonrural jurisdictions. It is recommended that additional studies be conducted to determine if there is an association between accreditation and health departments serving small, medium, and large populations to determine if differences exist. Additional studies should also be conducted to determine if there is an association between accreditation and rural counties

as compared to nonrural counties with a larger sample of rural counties. Additional time may be needed in order for additional rural local health departments to become accredited for such studies to be undertaken.

Fourth, additional studies are needed to examine whether there is a difference in the association of accredited health departments and health indicators and outcomes in decentralized (home rule) jurisdictions versus other governance models (i.e., centralized and mixed/shared governance). This type of study would be of critical importance in that the resources in decentralized jurisdictions come largely through local governmental authority as compared to other models such as centralized, where local health departments are primarily led by employees of the state and health department resources, and policies are provided directly from the state (CDC, 2018). This study included only two centralized and 16 shared agencies in the sample; however, of note is that each accredited health department was matched on all criteria with a nonaccredited health department.

Fifth, a recommendation is made for additional studies that are focused on city health departments and on regional or multijurisdictional local health departments. This study included county and city/county local health departments and excluded city and multijurisdictional agencies. Models to study this will be important to consider in their development, given that the number of counties in each multijurisdictional agency is unique and a study design of matching such as this one may not be as readily performed. However, given the delivery of services over a larger region by a single agency, study with multijurisdictional health departments as the sample in particular will be important. Finally, additional studies are needed to examine social determinants in the jurisdictions

of accredited and nonaccredited local health departments to determine if differences exist.

Implications

The purpose of this study was to address a knowledge gap in the literature concerning accreditation as a predictor of health indicators and health outcomes in the jurisdictions served by local health departments. Health indicators for communicable disease, health promotion, and maternal child health, and health outcomes for premature death and infant mortality, were compared between matched accredited and nonaccredited local health departments. Overall, accreditation was a statically significant predictor for improved health status, smoking, physical inactivity, diabetes, teen births, and premature death ($p < 0.05$), and trends of improved (though not statistically significant) indicators and outcomes were observed for chlamydia, HIV, BMI, low birth weight, and infant mortality. Trends toward improved health were found for all 11 health indicators and outcomes. An additional finding was that using the sign test all 11 indicators demonstrated the same trend and was significant. The study may promote positive social change as accredited health departments, nationally recognized for their optimal organizational performance, are better positioned to bring about social change through improved health outcomes and community health status for the factors and outcomes included in this study.

To date, health department benefits identified as a result of participating in the national, voluntary public health accreditation program have included stimulation of quality improvement, performance management, and means of enhancing accountability, consistency, and alignment of public health services with community needs (Shah et al., 2015; Siegfried, Heffernan, Kennedy, & Meit, 2018). The PHAB accreditation program

has influenced the field of public health (accredited and nonaccredited health departments) by providing standardized guidelines for activities such as organizational strategic plans, community health assessments, and health improvement plans (Siegfried, et al., 2018).

This study adds to and expands the benefits of accreditation for local health departments with the results of the association of improved health status and health outcomes. As the goal of voluntary public health accreditation is to promote and protect the public's health (i.e., healthier communities) through optimal organizational performance, this study also adds value to the recognition of local health departments as being accredited and the process of becoming accredited. It is important for communities, stakeholders, elected officials, and the field of public health to recognize the value of accreditation and the association with improved health indicators and outcomes which may result in more agencies seeking accreditation. Communities, elected officials, and funders may have expectations that their health department become accredited and operate at a level of performance and quality that is associated with improved health factors and outcomes, especially given that public dollars provide the majority of funding for the delivery of public health services.

As national voluntary public health accreditation was implemented only recently, it is necessary to continue to seek to more fully demonstrate the impact of accredited health departments on the populations they serve. By continually studying accredited and nonaccredited health departments, studies such as this one increase understanding of the impact and influence of a measurement process that is based on a set of nationally recognized standards representing optimal organizational performance on community

health (Beitsch et al., 2014; PHAB, 2013).

Conclusions

The goal of the first-ever voluntary accreditation program, led by the PHAB, is to recognize organizational performance that meets national standards intended to promote and protect the public's health. The PHAB accreditation program represents a significant change for public health as health departments are recognized for levels of organizational performance and quality. The need to develop an evidence base and body of knowledge through qualitative and quantitative research methods regarding all aspects of the process of becoming accredited, as well as the outcomes and impact of accreditation on organizations and the populations they serve, is ongoing. Especially important based on the finding of this study will be additional scientific inquiry that validates this study and further builds upon the results.

Given that most public health interventions have been demonstrated to be cost-saving and provide substantial returns on investment, and given that this study has shown that accredited health departments are associated with improved health in their communities for certain factors, the cuts that are often seen in public health budgets, and the lack of incentive and/or funding to become accredited may represent a much greater cost to the health and well-being of individuals, communities, and the economy in general. In the future, and based on studies such as this one, communities, funders, and elected officials may have interest and expectations that their health department be accredited, with assurance they are functioning at an optimal level of performance in the delivery of services to their community as it is associated with better health. According to Herbert Hoover, "Public health service should be as fully organized and as universally

incorporated into our governmental system as is public education. The returns are a thousand fold in economic benefits, and infinitely more in reduction of suffering and promotion of human happiness" (Hoover, 1929). Based on the findings of this study, the investment in public health accreditation is an investment in better health.

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